REMARKS

Applicants acknowledge receipt of the Office Action dated July 31, 2002, in which the Examiner rejected all pending claims. Specifically, claim 14 is rejected under 35 U.S.C. § 112 and as anticipated by Firsich, claims 15 and 17-19 are rejected as anticipated by Droege, claims 15-19 and 24-25 are rejected as obvious over Firsich in view of Droege, claims 15 and 17-18 are rejected as obvious over Tan in view of Droege. Applicants have amended the claims and respectfully traverse the rejections for the reasons set out below.

§ 112 Rejection of claim 14

Applicants have amended claim 14 to incorporate the limitations of claim 1, from which it formerly depended. Applicants submit that this amendment cures the grounds for rejection under § 112.

§ 102 Rejection of Claim 14 as Anticipated by Firsich

The Examiner rejected claim 14 as anticipated by Firsich, stating that Firsich discloses porous carbon monoliths having

- surface areas over 500 m^2/g,
- electrical conductivities of about 25 S/cm,
- capacitances over 200 F/g,
- pore diameters of 20-100 Å (2-10 nm)[1], and
- densities greater than 0.5 g/cc,

where the carbon materials are made by carbonizing polymer powder/carbon powder blends.

Claim 14 has been amended to require that the polymer have a volumetric capacitance *in a non-aqueous electrolyte* of at least 20 F/cc. Applicants submit that the materials disclosed by Firsich do not have volumetric capacitances greater than 20 F/cc in a non-aqueous electrolyte, as attested in the attached Affidavit of Steven Dietz. The ability to make carbons with high capacitance in non-aqueous electrolyte is very important from a commercial application standpoint because the increased working voltage window of non-aqueous results in approximately a nine times increase in the potential energy that can be stored compared to aqueous electrolytes. For this reason, even though aqueous electrolytes have other potential advantages, such as lower resistance and toxicity, all major ultracapacitor manufacturers (such as Panasonic and Maxwell Technologies) use non-aqueous electrolytes. The present inventors are the first to successfully

[1] Applicants respectfully point out that the Examiner erroneously converted 20-100 Å to 2-10 μm. The error is harmless in view of in the present analysis.

show the use of monolithic carbon with large pores in non-aqueous electrolytes. Because the polymers of claim 14 exhibit properties not previously exhibited, they are not anticipated by Firsich and are allowable over the art of record.

§ 102 Rejection of Claims 15 and 17-19 as Anticipated by Droege

The Examiner also rejected claims 15 and 17-19 as anticipated by Droege, stating that Droege discloses open cell carbon foams having

- surface areas of 200-800 m^2/g,
- electrical capacitances of 10-80 F/g, which the Examiner converts to 3-72 F/cc,
- pore sizes of 10 – 25 nm, and
- densities of 300 – 900 mg/cc (0.3 – 0.9 g/cc).

Applicants submit that, despite the properties described above, Droege does not teach a carbon having a volumetric capacitance in a *non-aqueous electrolyte* of at least 20 F/cc, as required by the claims. As set out in the attached affidavit, the materials of Droege would not have volumetric capacitances in a non-aqueous electrolyte of at least 20 F/cc. Furthermore, Droege does not teach or suggest a material meeting this limitation. Again, heretofore, no one had shown the use of monolithic carbon with large pores in non-aqueous electrolytes. Hence, claim 15, as well as 17-19, which depend from it, are allowable over Droege.

§ 103 Rejection of Claims 15-19 and 24-25 as Obvious Over Firsich in View of Droege

Applicants respectfully traverse this rejection for the reasons set out above. Specifically, neither Firsich nor Droege teaches or discloses teach a carbon having a volumetric capacitance in a *non-aqueous electrolyte* of at least 20 F/cc, as required by the amended claims. Furthermore, there is no teaching in either reference that would lead one of ordinary skill in the art to combine the references. For these reasons, claims 15 and 24 and their dependent claims are allowable over the art of record.

§ 103 Rejection of Claims 15 and 17-18 as Obvious Over Tan in View of Droege

Applicants respectfully also traverse this rejection for the reasons set out above. Specifically, neither Tan nor Droege teaches or discloses a carbon having a volumetric capacitance in a *non-aqueous electrolyte* of at least 20 F/cc, as required by the amended claims. While the Tan reference does not disclose the electrolyte in which the Tan polymers were tested, as set out in the attached affidavit, the Tan materials were tested in aqueous electrolyte. Furthermore, there is no teaching in either reference that would lead one of ordinary skill in the art to combine the

references. For these reasons, claim 15 and its dependent claims are allowable over the art of record.

New Claims

New claims 28-30 have been added, which depend from claim 15 and are therefore allowable for the reasons set out above. These new claims are supported by the specification as filed and do not constitute new matter.

Conclusion

Applicants respectfully that the rejections of the claims have been overcome and that the claims as amended are allowable over the art of record. If the Examiner has any questions or comments, or otherwise feels it would be advantageous, he is encouraged to telephone the undersigned at (713) 238-8043.

Respectfully submitted,

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Marked-up Copy of Claims Showing Changes Made

14. (Once Amended) A ~~The~~ carbon prepared ~~by carbonization of the polymer~~ according to ~~claim 1~~ the following steps:

polymerizing a polymerizable component from a mixture containing said polymerizable component and a surfactant so as to form a polymer, said surfactant and said polymerizable component being present in said mixture in a molar ratio of at least 0.2 : 1 and said polymer having an average pore size greater than 4 nm, a density greater than 0.1 g/cc; and

carbonizing the polymer;

wherein said carbon has a volumetric capacitance in a non-aqueous electrolyte of at least 20 F/cc, ~~having~~ a pore size greater than 2 nm, a density greater than 0.1 g/cc, and an electrical conductivity greater than 10 Scm^{-1}.

17. (Once Amended) The carbon according to claim 15 having a surface area of ~~50~~ 891 to 2000 m^2/g.

24. (Once Amended) A porous carbon monolith with at least one dimension greater than 2 mm, a surface area between 200 and 2000 m^2/g, a density greater than 0.5 g/cc, a pore size greater than 10 nm, and a volumetric capacitance in a non-aqueous electrolyte of at least 20 F/cc.

28. (New) The carbon according to claim 15 having a volumetric capacitance in a non-aqueous electrolyte of at least 37 F/cc.

29. (New) The carbon according to claim 15 wherein the non-aqueous electrolyte comprises propylene carbonate.

30. (New) The carbon according to claim 15 wherein the non-aqueous electrolyte comprises NEt_4BF_4 in propylene carbonate.